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Household Electricity Consumption in Akungba-Akoko, Ondo State, Nigeria

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Abstract

The paper analysed the household electricity consumption in the Akunba-Akoko, Ondo State, Nigeria. A well-structured questionnaire was administered to 100 electricity users to obtain data. The paper employed a simple descriptive method to analyse the data. The paper's findings showed that electricity supply is epileptic in the study area, prompting customers to seek other sources. Most respondents have generators, with few having power inverters and solar panels. The findings indicated that consumers spent an average of ten thousand seven hundred to thirty-five thousand Naira (₦10,700 - ₦32,450) on alternative electricity sources per month. This amount is more than they would have paid if the power supply had been reliable. The paper concluded that the electricity supply is irregular and recommended that the BEDC provide regular electricity and prepaid metres for electricity users in the study area.

Keywords: Household, electricity, electricity cost, alternative source, generator, power supply

1. INTRODUCTION

Every society places a high value on electricity for economic and social well-being. It is widely utilised in developed and developing countries, such as Africa. Electricity plays an essential role in industrial production, communication, and recreational activities. Despite the abundance of energy resources in Africa, the continent is experiencing a severe electricity shortage, which has a significant influence on the lives of its residents (African Development Bank, 2019). With an annual electricity consumption of 124kW-hours, just 24 per cent of the population in Sub-Saharan Africa (SSA) has access to electricity (Abanda, 2012). The region's energy consumption is 7% electricity, compared to global consumption of 18 per cent and North African consumption of 19 per cent. In 2012, the service sector consumed around 20 per cent of total power use in SSA, while households consumed 27% and the industrial sector consumed 50% (International Energy Agency, 2014).

Nigerian electricity generation began in 1886, establishing two generating facilities to service the Lagos Colony. Since then, the Nigerian power sector has seen numerous advances and reforms. A series of policy changes have resulted in reforms that rebranded to Power Holding Company of Nigeria in 2005 (PHCN) (Osakwe, 2017). The Nigerian electricity sector is today divided into three subsectors: power production companies (GENCOs), transmission companies (TRANSCOs), and distribution companies (DISCOs). Another reform implemented to increase electricity generation capacity was the establishment and granting of numerous Independent Power Producers (IPPs) licences under the auspices of the National Integrated

Power Project (NIPP) (Oyewo et al., 2018). With an installed capacity of 12,522 MW, Nigeria's on-grid generating plants today include twenty-two gas and three hydropower units. However, given Nigeria's potential for conventional and renewable energy use, this capacity is clearly inadequate (Ogbonnaya et al., 2019).

Although Nigeria's power industry has made substantial progress, the country's energy-producing capacity remains woefully inadequate, despite the country's long history of electricity use and recent reforms. The country's electricity supply is chronically undeveloped in spite of the country's expanding population (Oyedepo, 2012). While natural gas power stations account for 86% of Nigeria's on-grid power generation capacity and three large hydropower plants account for 14%, off-grid power generation in Nigeria is mainly fueled by diesel and gasoline generators. This often results in power outages, frequent load-shedding, and insufficient electricity supply, with access to electricity becoming a concern in the country. As a result of this unmet requirement for electricity, backup generators have grown in popularity (Akuru et al., 2017; Roche et al., 2017).

Additionally, and according to data from Nigeria's Electricity Regulatory Commission, only 45 per cent of electricity users have metres, while 54 per cent do not (Daily Trust, 2017). Customers refusing to pay their bills and overbilling have been regular repercussions of the DICOs' inability to give metres to electricity users (Olaniyan et al., 2018; Vanguard Newspaper, 2017).

The preceding describes the state of power supply in Nigeria's several states. For example, Ondo State's electricity supply has been erratic, particularly in Akungba-Akoko. For many years, Akungba-Akoko has suffered irregular power supply. The Benin Electricity Distribution Company (BEDC), responsible for distributing electricity to Akungba, has been unable to supply regular electricity, forcing residents to rely on alternative energy sources. While there are numerous studies on electricity consumption in Nigeria, there is less evidence of such studies for Akungba-Akoko. This study fills this gap.

2. BRIEF REVIEW OF LITERATURE

Numerous studies have been undertaken in industrialised and developing nations to determine household power. Borozan (2013) investigated the relationship between energy use and economic growth in Croatia from 1992 to 2010. The empirical study found a one-way causal relationship between total energy use and economic growth. Solarin and Shahbaz (2013), on the other hand, investigated the nexus between growth and power consumption in Angola from 1971 to 2009. The study revealed long-term associations and two-way causal linkages between electricity usage and growth.

Similarly, Tang and Tan (2013) used VECM from 1971 to 2010 and found substantial causation between Algerian electricity use and development. The finding is comparable to Ibrahiem (2015) for the Ivory Coast and Iyke (2015) for Nigeria. Unlike previous research, Apergis et al. (2016) examined the link between Singapore's energy usage, entrepreneurship, and manufacturing output. The study discovered that power usage adjusts slowly to industrial output and entrepreneurship shocks.

The study of Ouedraogo (2013) investigated the link between economic development and electricity availability in 15 African nations from 1980 to 2008 using a panel approach. It found one-way causation between electricity use and economic growth. Additionally, AlKhars (2019) evaluated literature from 1983 to 2018 on the power industry in Gulf Cooperation Council (GCC) nations. The review summarised the research over time and assessed the data, keywords, and publication period.

Also, Niu et al. (2016) examined the influence of various variables on household energy usage in western China using survey research. The findings indicated a strong correlation between electricity usage, income, the variety of electrical appliances and their prices, and the size of households. Still, in China, Shao (2017) evaluated the country's power consumption and growth across time, region, and industry. The findings recommended that China build an adequate integrated framework to allow a more comprehensive examination of the relationship.

Likewise, Olaniyan et al. (2018) calculated Nigeria's present and projected household power consumption and the capacity needed to attain 100 per cent energy availability. The average residential power consumption per capita was anticipated to be between 18 and 27 kWh but differ significantly between geographical zones. Conversely, Oyewo et al. (2018) found that the best sustainable power option for Nigeria in future is a combination of renewable energy technologies and a diverse array of storage systems.

In the same vein, Babatunde and Enehe (2018) discovered that in Nigeria, household energy consumption is determined by the size of the residence, the number of rooms, and the hours of power supply. In a similar vein, Ajayi (2018) researched Household Energy use in the Southwestern part of Nigeria and found that kerosene is the primary cooking fuel used by around 90% of homes, with LPG and electricity being used seldom. Additionally, the survey discovered that kerosene is favoured across all socioeconomic classes, with a greater proportion of families' budgets dedicated to its usage.

3. METHODOLOGY AND DISCUSSION OF RESULTS

The survey method is used in this study to investigate household electricity consumption in Akungba-Akoko. The study utilised a random sample approach to obtain data from 100 electricity users using a well-structured questionnaire. The data were analysed using simple descriptive analysis.

Table 1 : Household characteristics

Variables	Frequency (N= 100)	Percentage (%)
Gender		
Male	60	60%
Female	40	40%
Age		
18-25	03	03%
26-33	37	37%
34-40	06	06%
41 above	54	54%
Level of Education		
No formal education	4	4%
Primary	15	15%
Secondary	63	63%
Tertiary	18	18%
Monthly Income		
₦5,000-₦20,000	77	77%
₦21,000-₦50,000	09	09%
Above ₦50,000	14	14%

Source: fieldwork, 2018

The characteristics of the households are shown in Table 1. 60% of the respondents are men, while 40% are women. 3% are between the ages of 18 and 25, 37% are between the ages of 26 and 33, 6% are between the ages of 34 and 40, and 54% are over 40 years. Regarding academic qualifications, 4% had no education, 15% had primary education, 63% had secondary education, and 18% had tertiary education. Furthermore, 77% make between ₦5,000 and ₦20,000 per month, 9% earn between ₦21,000 and ₦50,000 per month, and 14% earn more than ₦50,000 per month. These demonstrate the area's household composition diversity.

Table 2: Electricity availability and cost

	Frequency	Percentage
Metre type		
Prepaid	21	21%
Postpaid	59	59%
No meter	20	20%
Electricity Availability per day		
1-4 hours	86	86%
More than 4 hours	14	14%
Electricity Availability weekly		
3-4 times	72	72%
More than 4 times	28	28%
Cost: Prepaid (monthly)		
Below ₦1,500	7	33.3%
₦1,501- ₦2,000	9	42.9%
₦2,500- ₦3,000	4	19.0%
Above ₦3,000	1	4.8%
Cost: Post-paid (monthly)		
Below ₦1,500	8	13.6%
₦1,501- ₦2,000	20	33.9%
₦2,500- ₦5,000	28	47.5%
Above ₦5,000	3	5.0%
Cost: No metre (monthly)		
Below ₦2,000	NIL	0%
₦2,000 and Above	20	100%

Source: fieldwork, 2018

The findings in Table 2 show that electricity supply is epileptic since most respondents indicated that power is delivered three to four days weekly in the area and lasts no more than four hours. According to the findings, 59% of respondents had postpaid metres, 21% had prepaid metres, and the rest were not metred. Because the costs on their prepaid cards depend on use, most prepaid metre customers spend less than ₦2,500 monthly on power usage as a result of intermittent power supply. The cost is greater for postpaid customers, with most claiming to have spent between ₦1,500 and ₦5,000, while a few claiming to have paid more according to the appliances they used. According to the findings, individuals without metres are subject to estimated billing with a monthly minimum of ₦2,000. According to the results, households were occasionally charged as much as ₦10,000 or more depending on their building.

Table 3: Alternative sources of electricity and cost

	Frequency	Percentage
Alternative sources		
Generator	57	57%
Inverter	14	14%
Solar power	04	04%
None	25	25%
Types of generator		
I pass my neighbour	35	61.4%
Medium size	16	28.1%
Big size	06	10.5%
Length of time in using generator per day		
1 – 2 hours	25	43.9%
3 – 4 hours	20	35.0%
5 – 6 hours	7	12.3%
Above 6 hours	5	8.8%
Fuel consumption (PMS)		
2 – 4 litres	28	49.1%
5 – 7 litres	19	33.3%
8 – 10 litres	05	8.8%
Above 10 litres	05	8.8%
Cost of servicing generator		
₦1,000 - ₦2,000	31	54.4%
₦2,001 – ₦3,000	15	26.3%
₦3,001 – ₦5000	09	15.8%
Above ₦5000	2	3.5%

Source: fieldwork, 2018

Furthermore, the findings from Table 3 show that around 57% of respondents have other sources of energy supply to guarantee consistent electricity supply owing to the BDC, which regulates electricity supply in the area, having an epileptic power supply. Most of them have generators, while a few others have power inverters or solar panels. The majority of generator owners have the smallest (popularly known as "I pass my neighbour") and medium-sized types, although some have larger sizes. According to the findings, most respondents use their generators for one to four hours daily and consume between two and seven litres of fuel, depending on the generator's size. Respondents pay an average of ₦1,000 to ₦3,000 each month to maintain their generators. Those who own inverters or solar panels pay far less, except for the initial acquisition cost, which they perceive to be exorbitant, and the occasional maintenance.

With the price of Premium Motor Spirit (PMS) at ₦145[1], we can calculate that most households spent an average monthly cost of ₦10,700-₦32,450 (for 2-7 litres daily + ₦1,500 for an average cost of servicing their generators)[2] to supply an alternative source of electricity using their generators. These sums are more than what the households would have spent if the electricity supply in the Akungba had been consistent.

[1] This was the pump price in 2018 when the research was conducted. The average pump price as at the time of writing this paper is ₦165

[2] We assume they on their generators for 30 days each month. We based our calculations on ₦145 per litre of PMS. The average cost of serving generators for most of the households is calculated as (₦1,000+₦3,000)/2 =₦2,000

4. CONCLUSION

This paper examines households electricity consumption in the Akungba Akoko. According to the study's findings, electricity from the BEDC has been irregular in the area. With less than six hours of availability, the majority of respondents could only use power four times a week. Further investigation found that households sourced for electricity via other sources, such as inverters, solar panels, and generators, which are too expensive given the area's economic circumstances. As a result, the study recommends that the government offer alternative viable power sources in the study area so the public may have electricity at a lower cost. To accelerate the growth of renewable energy in the area, the government should give appropriate funding for scientific research. Similarly, the BEDC should guarantee that electricity is constantly supplied and that the bill given to postpaid metre users is proportionate to their electricity consumption to prevent arbitrary charges. The BEDC should also ensure that prepaid metres are available to power customers in the area.

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